

ANNUAL REPORT FOR 2002



Wiggins Mill Mitigation Site
Wilson County
Project No. 8.1330509
TIP No. R-1030WM



Office of Natural Environment & Roadside Environmental Unit
North Carolina Department of Transportation
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SUMMARY

The following report summarizes the monitoring activities at the Wiggins Mill Mitigation Site. This site was constructed in the fall of 2000 to provide wetland mitigation for U-3472 and R-1030. Planting activities were completed in March 2001. The site is monitored using eighteen hydrologic monitoring gauges and eleven vegetation plots. The year 2002 reflects the second complete year that monitoring has taken place on the site.

In early spring 2002, four additional gauges were added to the original 18 on the Wiggins Mill Site. During the 2002 monitoring season, All 22 of these monitoring gauges showed saturation for more than 5% of the growing season. The daily rainfall data depicted on the gauge data graphs is recorded by an on-site rain gauge installed prior to the 2001 growing season. Additional rainfall data from a gauge in Wilson, NC was provided by the NC State Climate Office and was used to determine the average rainfall range for the site. Based on this data, Wilson experienced a dry early growing season in 2002, the most critical part of the year in which hydrologic success criteria is usually met.

Based on a field meeting in May 2002, the main stream thread revealed a small “head cut” near the culvert discharge location at US 264. Upon agency request, a follow-up meeting was held with the NCDOT Hydraulics Unit to determine the cause and to develop a proposal for remediation. In August 2002, a follow-up meeting was held to discuss the NCDOT proposal with the Corps of Engineers and the Division of Water Quality (DWQ). At that time, the DWQ requested a survey of the stream in order to justify the proposal. NCDOT also scoped KCI, the stream/ wetland designer, to survey all stream threads, as well as reference their reaches. This work is currently underway. Upon completion, a meeting will be scheduled with the regulatory agencies to reach a consensus on a remediation plan.

The 2002 vegetation monitoring of the site revealed an average tree density of 466 trees per acre, with only 2 of the 8 plots not meeting success criteria. The overall average density is above the minimum success criteria of 320 trees per acre.

The NCDOT recommends that all monitoring activities be continued at the Wiggins Mill site.

1.0 Introduction

1.1 Project Description

The Wiggins Mill Mitigation Site is located in Wilson County south of the Wiggins Mill reservoir southwest of the City of Wilson and encompasses approximately 89 acres (Figure 1). The site's grading was completed in October 2000 and planting in March 2001. The second year of monitoring at the site has just been completed.

The site serves as mitigation for U-3472 and R-1030. The site includes 7,020 linear feet of stream restoration, 11.31 acres of buffer restoration, 84 acres of small stream swamp hardwood (1st and 2nd order streams), bottomland hardwood, swamp hardwood, and headwater forest/low elevation seep wetland communities restoration, and 5.3 acres of bottomland hardwood enhancement.

1.2 Purpose

In order to demonstrate successful mitigation, hydrologic and vegetative monitoring must be conducted for a minimum of five years. Success criteria are based on federal guidelines for wetland mitigation. These guidelines stipulate criteria for both hydrologic conditions and vegetation survival. The following report details the results of hydrologic and vegetative monitoring during the 2002 growing season at the Wiggins Mill Mitigation Site. Included in this report are analyses of both hydrologic and vegetative monitoring results, as well as local climate conditions throughout the growing season, and site photographs.

1.3 Project History

October 2000	Site Grading Completed
February 2001	Herbicide Application
March 2001	Monitoring Gauges Installed
March 2001	Site Planted
March- November 2001	Hydrologic Monitoring (1 yr.)
July 2001	Vegetation Monitoring (1 yr.)
March- November 2002	Hydrologic Monitoring (2 yr.)
June 2002	Vegetation Monitoring (2 yr.)

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1.4 Debit Ledger

Table 1. Wiggins Mill Mitigation Site Debit Ledger

Site Habitat	Mitigation Plan			TIP Debit	
	Acres at Start	Acres Remaining	% Remaining	U-3472	R-1030
SPH Restoration	45.00	8.44	18.76		36.56
BLH Restoration	39.00	4.52	11.59	0.44	34.04
BLH Enhancement	5.00	5.00	100.00		
Buffer	11.31	6.56	58.00	4.75	
Total	100.31	24.52	24.44		

SPH: Swamp Hardwood

BLH: Bottomland Hardwood

2.0 Hydrology

2.1 Success Criteria

In accordance with federal guidelines for wetland mitigation and the wetland mitigation plan (entitled “North Carolina Department of Transportation (NCDOT) Wiggins Mill Mitigation Plan Wilson County, North Carolina”, dated February 1, 1999) the success criteria for hydrology states that the area must be inundated or saturated (within 12” of the surface) by surface or ground water for at least a consecutive 5% of the growing season. This success criteria was agreed upon as part of the special conditions set forth by the Corps of Engineers (COE) through their issuance of permits for NCDOT’s TIP projects U-3472 and R-1030.

The growing season in Wilson County begins March 20 and ends November 12. The dates correspond to a 50% probability that temperatures will remain above 28° F or higher after March 20 and before November 12.¹ The growing season is 236 days; therefore, the minimum duration for 5% of the growing season to have wetland hydrology is 12 consecutive days.

2.2 Hydrologic Description

Eighteen monitoring gauges were installed on site in March of 2001 (Figure 2). Four additional groundwater gauges were installed on site in spring 2002, (WM-G19, WM-G20, WM-G21, WM-G22). These gauges were installed, based on the agency review meeting, in between marginal gauges and gauges that failed to meet success criteria in 2001.

The automatic monitoring gauges record daily readings of the groundwater depth. The 2002 data represents the second full growing season for hydrologic monitoring.

¹ Soil Conservation Service, Soil Survey of Wilson County, North Carolina, p.79.

2.3 Results of Hydrologic Monitoring

2.3.1 Site Data

The maximum number of consecutive days that the groundwater was within twelve inches of the surface was determined for each gauge. This number was converted into a percentage of the 236-day growing season (March 20 – November 12). Table 2 shows the hydrologic results for 2002.

Figure 3 represents a graphical representation of the hydrologic results. Gauges highlighted in blue indicate wetland hydrology for more than 12.5% of the growing season. Gauges highlighted in red show hydrology between 8% and 12.5% of the season, while those in green indicate hydrology between 5% and 8% of the season. Gauges highlighted in black indicate no wetland hydrology (less than 5% of the growing season).

Figure 2. Wiggins Mill Site Gauge Location Map

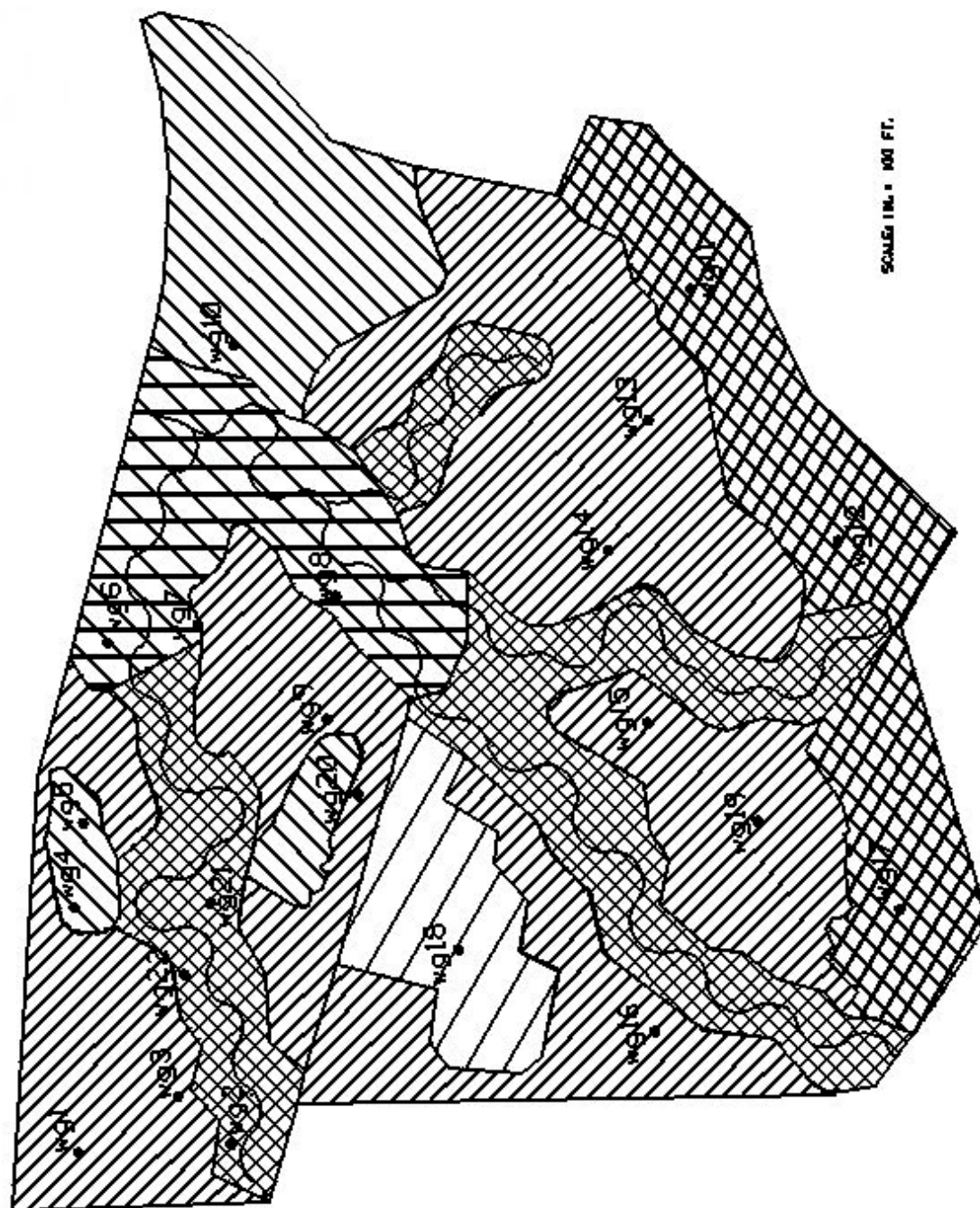


Table 2. 2002 Hydrologic Monitoring Results

Monitoring Gauge	< 5%	5 – 8%	8 – 12%	> 12.5%	Actual %	Success Dates
WM-G1*			✓		9.7	Oct 21 – Nov 12
WM-G2*		✓			6.3	Oct 29 – Nov 12
WM-G3*				✓	13.9	Oct 11 – Nov 12
WM-G4				✓	13.9	Oct 11 – Nov 12
WM-G5				✓	13.9	Oct 11 – Nov 12
WM-G6				✓	13.9	Oct 11 – Nov 12
WM-G7				✓	13.5	Oct 12 – Nov 12
WM-G8				✓	14.3	Mar 20 – Apr 22
WM-G9				✓	13.5	Oct 12 – Nov 12
WM-G10				✓	13.9	Oct 11 – Nov 12
WM-G11				✓	32.8	Aug 27 – Nov 12
WM-G12				✓	15.5	Mar 20 – Apr 25
WM-G13				✓	13.9	Oct 11 – Nov 12
WM-G14*			✓		12.2	Oct 15 – Nov 12
WM-G15				✓	13.5	Oct 12 – Nov 12
WM-G16*				✓	13.2	Oct 12 – Nov 12
WM-G17				✓	33.0	Aug 26 – Nov 12
WM-G18				✓	13.5	Oct 12 – Nov 12
WM-G19				✓	13.5	Oct 12 – Nov 12
WM-G20*			✓		8.8	Oct 23 – Nov 12
WM-G21*				✓	13.5	Oct 12 – Nov 12
WM-G22*				✓	13.5	Oct 12 – Nov 12

* These gauges only met minimum hydrologic success criteria during periods of above normal rainfall.

As the correlation in success dates shows, the majority of gauges had their longest period of successive saturation during the time of above average rainfall in the last few months of the growing season. It should be noted, however, that many of these gauges also met the minimum criteria of 12 days (5%) saturation earlier in the growing season. The asterisked gauges (eight in total) only met the minimum criteria during period of above average rainfall. Gauges indicating hydrologic success are distributed throughout the site and are not limited to areas adjacent to on-site streams.

Specific gauge problems:

- Gauge 14 did not record data from April 20 to May 14, due to malfunction.
- Gauge 16 did not record data from May 15 to June 19, due to malfunction and was replaced.
- Gauge 19 did not record data from May 15 to June 18, due to battery failure. The gauge went down again from June 29 to Sept. 10, when the gauge was replaced.
- Gauge 20 did not record data from Oct. 14 to Oct 22, due to battery failure.

Appendix A contains hydrologic graphs of the groundwater depth for each monitoring gauge during 2002. These monitoring gauge graphs are designed to show the reaction of the groundwater level to specific rainfall events. The individual precipitation events, shown on the monitoring gauge graphs as bars, represent data collected from the on-site rain gauge.

2.3.2 Climatic Data

Figure 4 is a comparison of monthly rainfall for the period of November 2001 through October 2002 to historical precipitation (collected between 1970 and 2002) for Wilson, North Carolina. This comparison gives an indication of how 2002 relates to historical data in terms of average rainfall. The NC State Climate Office provided all historical data.

Monthly rainfall for the site fluctuated around the average rainfall for 2002. November (2001), December (2001), February, March, April, and May experienced below average rainfall. The months of June, September, and October all recorded average rainfall for the site. January, July and August experienced above average rainfall. Overall, the site experienced below average rainfall for 2002.

2.4 Conclusions

The year 2002 is the second full year of hydrologic monitoring for this site. All 22 monitoring gauges met the success criteria showing saturation for more than 5% of the growing. Eighteen of the twenty-two gauges showed saturation for 12.5% of the growing season, 3 of the gauges showed saturation between 8 and 12.5% of the growing season, and 1 of the gauges showed saturation between 5 and 8% of the growing season. The site experienced below normal rainfall yet met hydrologic success criteria for the second year of monitoring.

Figure 3. 2002 Wiggins Mill Site Hydrologic Monitoring Results

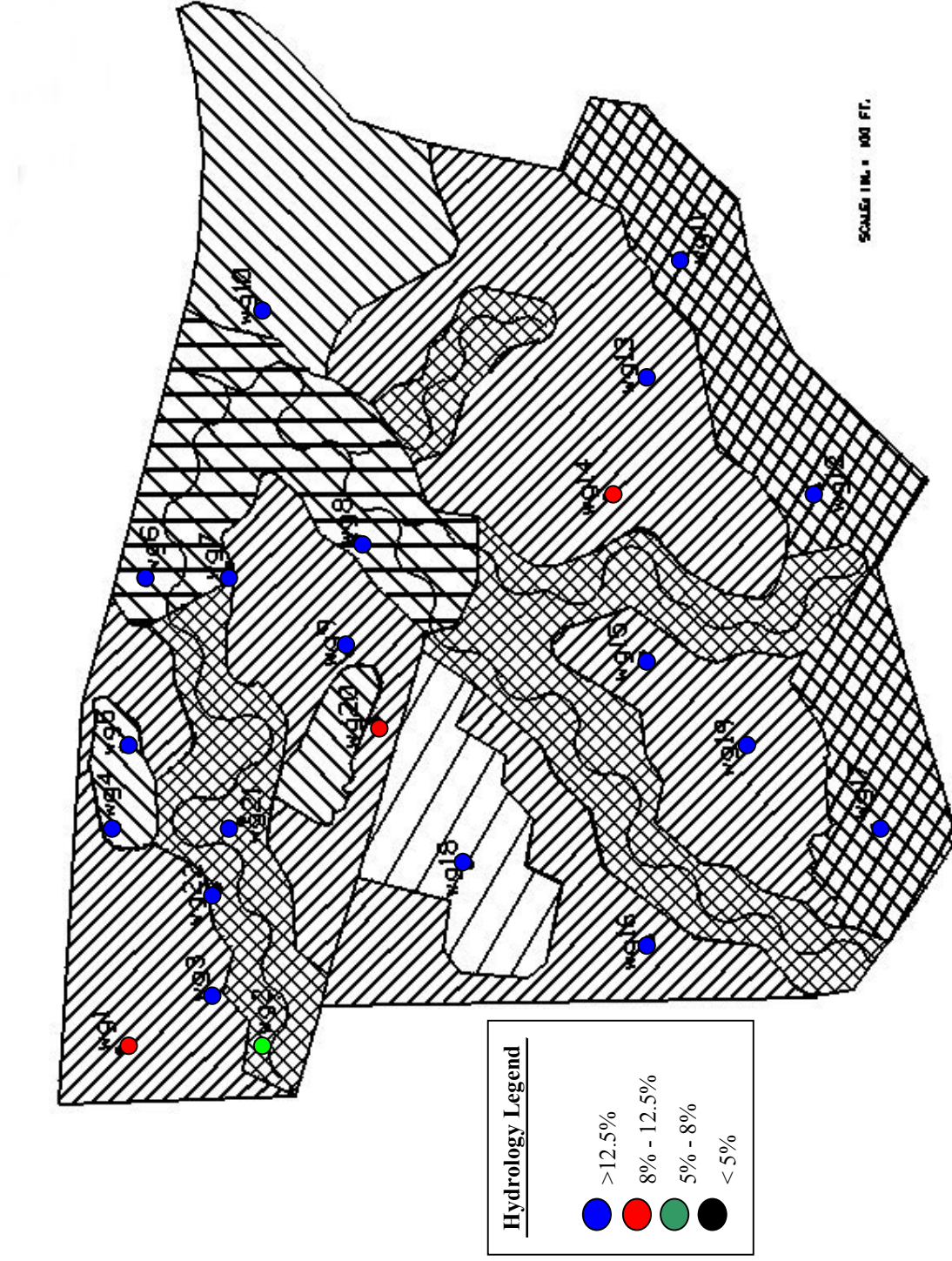
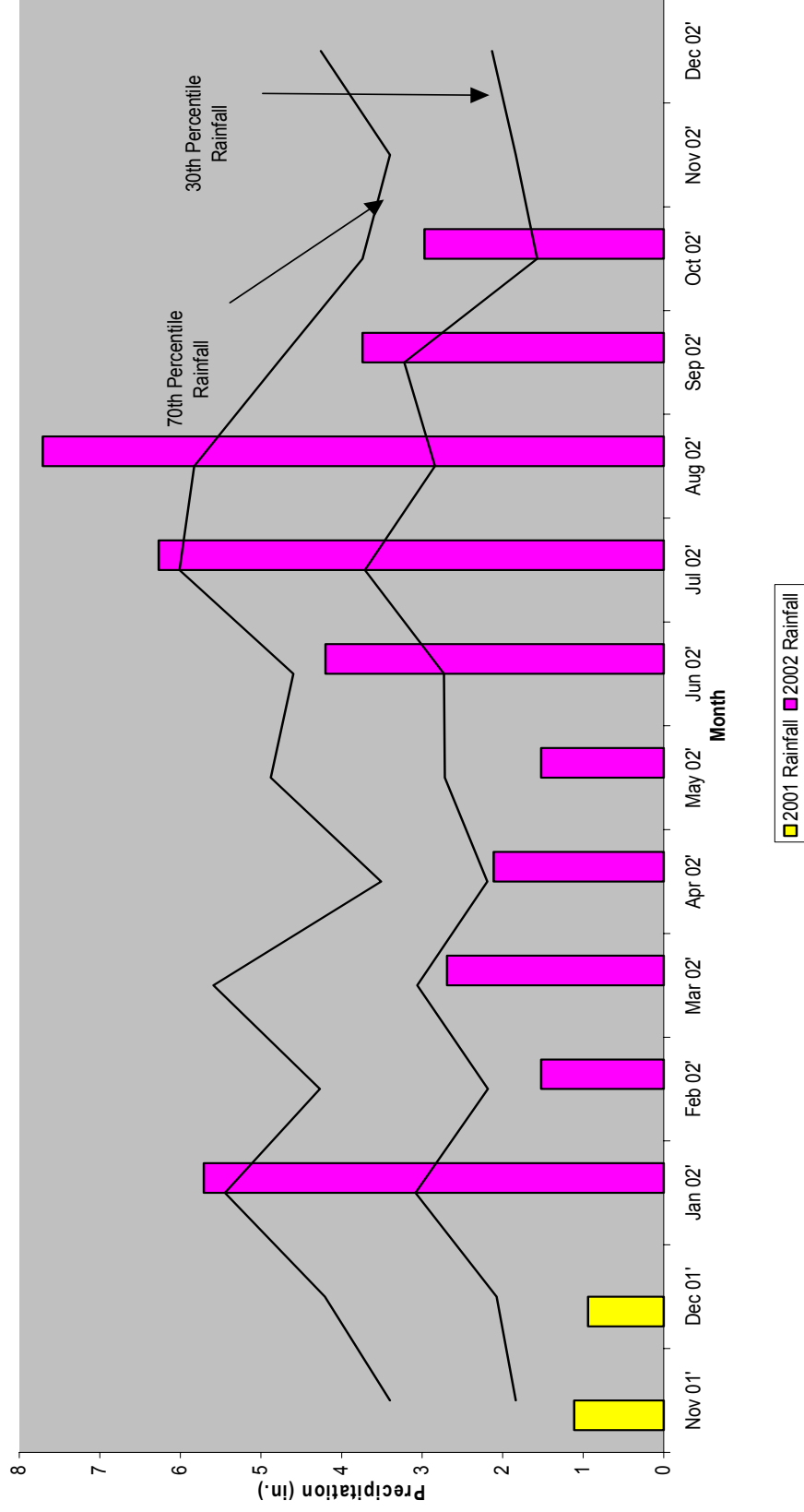


Figure 4, Wiggins Mill 30-70 Graph
Wilson, NC



3.0 Vegetation (Year 2 Monitoring)

3.1 Success Criteria

Success Criteria states that at least 320 stems per acre must survive after the completion of the third growing season and 240 stems per acre after the fifth growing season. If desired vegetation has not been established, NCDOT will notify the appropriate agencies and will implement corrective measures.

3.2 Description of Species

The following tree species were planted in the Wetland Restoration Area:

Zone 1: Headwater Forest (12 acres)

Fraxinus pennsylvanica, Green Ash
Quercus laurifolia, Laurel Oak
Betula nigra, River Birch
Nyssa sylvatica var. *biflora*, Swamp Blackgum
Quercus nigra, Water Oak
Quercus phellos, Willow Oak

Zone 2: Bottomland Hardwood (39 acres)

Fraxinus pennsylvanica, Green Ash
Quercus laurifolia, Laurel Oak
Nyssa sylvatica var. *biflora*, Swamp Blackgum
Liriodendron tulipifera, Tulip Poplar
Quercus nigra, Water Oak
Quercus phellos, Willow Oak
Quercus lyrata, Overcup Oak

Zone 3: Swamp Hardwood (10 acres)

Taxodium distichum, Baldcypress
Quercus lyrata, Overcup Oak
Nyssa sylvatica var. *biflora*, Swamp Black Gum
Nyssa aquatica, Water Tupelo
Quercus laurifolia, Laurel Oak
Quercus phellos, Willow Oak

Zone 4: Small Stream Swamp (1st order)

Fraxinus pennsylvanica, Green Ash
Quercus laurifolia, Laurel Oak
Nyssa sylvatica var. *biflora*, Swamp Blackgum
Quercus nigra, Water Oak
Quercus phellos, Willow Oak
Liriodendron tulipifera, Tulip Poplar

Zone 5: Small Stream Swamp (2nd order)

Taxodium distichum, Baldcypress

Quercus lyrata, Overcup Oak

Nyssa sylvatica var. *biflora*, Swamp Blackgum

Fraxinus pennsylvanica, Green Ash

Quercus laurifolia, Laurel Oak

Quercus phellos, Willow Oak

3.3 Results of Vegetation Monitoring

Table 3. Vegetation Monitoring Statistics, by zone and plot

Site Notes:

Zone 1: Other species noted: trumpet creeper, morning glory, horse-nettle, hickory, holly, *Juncus sp.*, and pokeberry.

Zone 2: Other species noted: horse-nettle, dog fennel, bitter sneezeweed, pokeberry, *Baccharis sp.*, trumpet creeper, and pokeberry. Trees planted in areas surrounding Plot 9 appear to have a much higher survival rate than those in Plot 9. The lack of success is likely due to poor soil conditions as a result of the grading activities that took place during site construction and the drought condition for 2002. Plot 9 does not provide an adequate representation of the survival within Zone 2.

Zone 3: Other species noted: horse-nettle, dog fennel, sneezeweed, pokeberry, trumpet creeper, poison ivy, broom sedge, and winged sumac. Trees planted in areas surrounding Plot 5 appear to have a much higher survival rate than those in Plot 5. The lack of success in Plot 5 is likely due to poor soil conditions as a result of the grading activities that took place during site construction and the drought condition for 2002. Plot 5 does not provide an adequate representation of the survival within Zone 3.

Zone 4: Other species noted: Same as above. Plot 3 had various grasses that cover approximately 30% of the plot. Plot 3 also contained volunteer yellow poplar and sweet gum.

Zone 5: Bald cypress was noted around plot 4.

3.4 Conclusions

Of the 89 acres on this site, approximately 83.7 acres involved tree planting. There were 11 vegetation monitoring plots established throughout the planting areas. The 2002 vegetation monitoring of the site revealed an average tree density of 466 trees per acre. This average is above the minimum success criteria of 320 trees per acre. The stream channel was visually monitored during the annual vegetation monitoring of this site. The streambank was heavily vegetated with herbaceous vegetation and stabilized in all areas except where matting was not installed. Photos 11 through 24 show the conditions of the stream.

NCDOT will continue to monitor this site.

4.0 Overall Conclusions

- All 22 gauges met the minimum criteria by showing saturation for 5% of the growing season. The site experienced below average rainfall for 2002.
- Vegetation monitoring yielded an average plot density of 466 trees per acre, with all but two of the eight plots showing successful stem counts.
- NCDOT will finalize survey data and work to finalize remedial action for the streams in winter 2003. Remedial action is proposed for summer 2003 upon concurrence from the regulatory agencies.
- NCDOT will continue monitoring of the Wiggins Mill mitigation site for the 2003 year.

APPENDIX A

DEPTH TO GROUNDWATER CHARTS

APPENDIX B

SITE PHOTOS AND PHOTO AND PLOT LOCATIONS MAP

WIGGINS MILL



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6

WIGGINS MILL



Photo 7



Photo 8



Photo 9



Photo 10



Photo 11 (stream)



Photo 12 (stream)

WIGGINS MILL



Photo 13 (stream)



Photo 14 (stream)



Photo 15 (stream)



Photo 16 (stream)



Photo 17 (stream)



Photo 18 (stream)

WIGGINS MILL



Photo 19 (stream)



Photo 20 (stream)



Photo 21 (stream)



Photo 22 (stream)



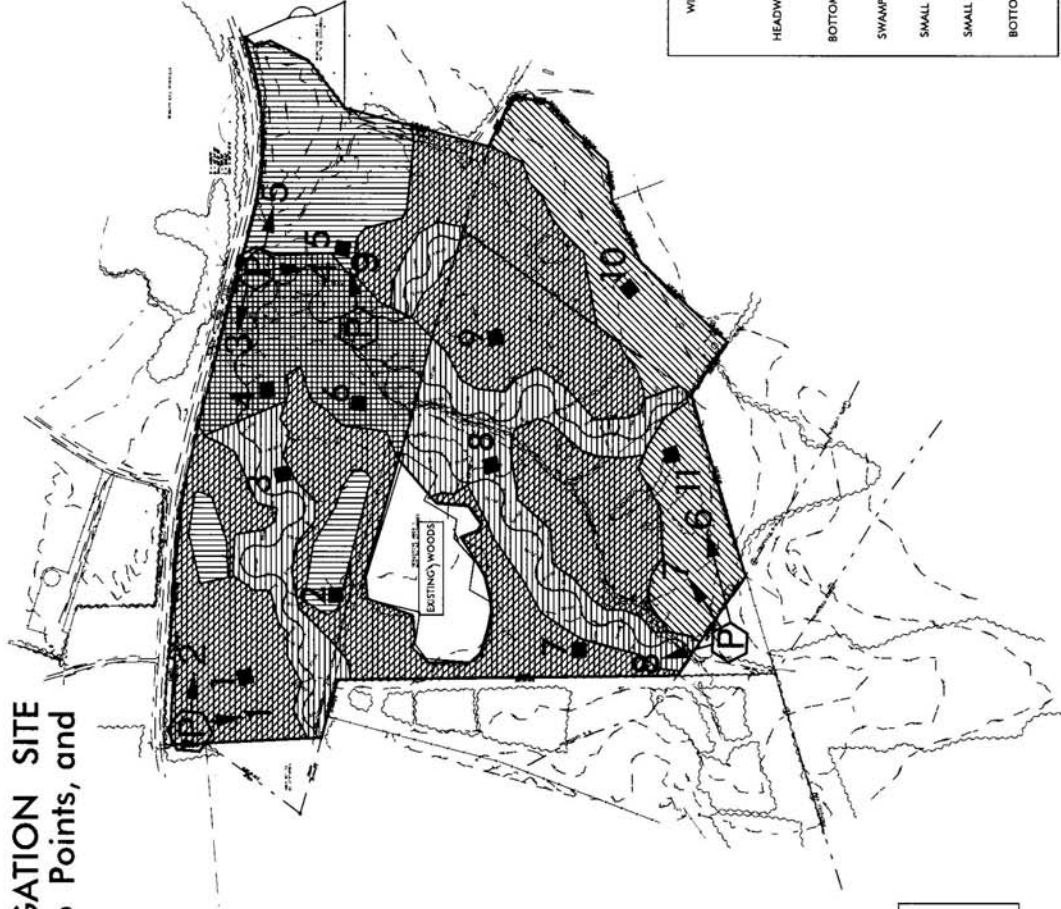
Photo 23 (stream)



Photo 24 (stream)

WIGGINS MILL MITIGATION SITE Planting Zones, Photo Points, and Vegetation Plots

PROJECT REFERENCE NO.	SHEET NO.
NEW SHEET NO.	HYDRAULICS ENGINEER
EXISTING SHEET NO.	ENGINEER



WIGGINS MILL PLANTING COMMUNITY LEGEND	
TYPE	SYMBOL
HEADWATER FOREST	
BOTTOMLAND HARDWOOD	
SWAMP HARDWOOD	
SMALL STREAM SWAMP (1ST ORDER)	
SMALL STREAM SWAMP (2ND ORDER)	
BOTTOMLAND HARDWOOD ENHANCEMENT	
EXISTING WOODS	

	Vegetation Plots
	Photo Points

